"Involving an AASERT Student in Marine Geological and Geophysical STRATAFORM Studies"

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Award Number: N00014-95-1-1069

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LONG-TERM GOALS and OBJECTIVES

The goal of STRATAFORM is to link short-term biological and physical processes affecting sedimentation ("event" stratigraphy" developed over hours to weeks) to the stratigraphic geometry and facies distribution of the upper ~100 m of continental margin sediments representing ~10^6 years of preserved record.

Three groups of processes have been isolated for study by STRATAFORM investigators: 1) shelf sediment dynamics and the development of lithostratigraphy; 2) slope processes and their role in shaping geomorphology; and 3) stratigraphic sequence generation. Collecting high-resolution seismic reflection data is at the core of this third approach. All three are linked by the goal of determining how the morphology and facies patterns of the modern sea floor (revealed by multibeam bathymetry, backscatter data, and sampling of the shelf and slope) compare with the preserved geologic record observed in seismic images and sampled in the subsurface.

APPROACH

Over the last several years, the mid- and outer continental shelves off New Jersey and northern California have been natural laboratories for STRATAFORM studies of the relationship between modern depositional processes and the preserved stratigraphic record. Data collected in both study areas include high-resolution MCS profiles (New Jersey, summer 1995; northern California, summer 1996), swath topographic and acoustic backscatter images, near bottom samples, and sediment transport information gathered by moored instruments. Plans are under discussion to collect additional subseafloor samples in both study areas by ONR-sponsored activities, the Ocean Drilling Program (ODP), and possibly the international IMAGES program. These data will augment the core, drill and log records previously acquired by ONR and ODP.

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ACCOMPLISHMENTS AND RESULTS

We attempted to involve students in several phases of the two parent projects: seismic data acquisition, data processing, and geologic interpretation. 2200 km of high-resolution, 48-channel MCS data were collected offshore northern California in summer, 1996, and while the acquisition aspect of the cruise was on the whole a great success, locating a qualified Columbia graduate student willing to go to sea was not. Seismic velocity analysis and display procedures were conducted onshore by several students with advice and guidance from the computer support and scientific staff at L-DEO. In addition to routine data handling, one student was tasked with developing a robust algorithm that could reduce or totally eliminate recording noise in the 1996 data that had arisen because of a malfunctioning streamer. While a solution was devised, it was found to be prohibitively time-consuming and labor-intensive, and reluctantly we decided to accept the data quality in its present form. Another student was tasked with helping to assemble and prepare data relevant to the preparation of a lengthy report to the Pollution Prevention and Safety Panel of the JOIDES advisory structure. The advice of this panel was sought in preparation for a deep coring program on the northern California margin that the STRATAFORM initiative may one day fund. Another student provided assistance in the visualization and interpretation of hi-res MCS data collected offshore New Jersey. These tasks involved transferring tracings of key seismic reflectors onto reflection profiles displayed on a computer workstation, and then using commercial seismic analysis software to correlate regional interpretations and prepare maps. Finally, AASERT funds were used to support students who opened, photographed, X-rayed, and archived piston cores from the New Jersey margin collected with STRATAFORM funds in summer, 1999.

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to Washington Headquarters Service, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188) Washington, DC 20503.

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1. REPORT DATE *(DD-MM-YYYY)*	2. REPORT TYPE	3. DATES COVERED *(From - To)*
06/11/2000	Performance/Final Technical	06/01/95-05/30/2000

4. TITLE AND SUBTITLE
Involving an AASERT Student in Marine Geological and Geophysical STRATAFORM Studies

5a. CONTRACT NUMBER
N00014-95-1-1069

5b. GRANT NUMBER

5c. PROGRAM ELEMENT NUMBER

6. AUTHOR(S)
Gregory S. Mountain, Research Scientist and Principal Investigator

5d. PROJECT NUMBER

5e. TASK NUMBER

5f. WORK UNIT NUMBER

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
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8. PERFORMING ORGANIZATION REPORT NUMBER
5-21755

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)
Office of Naval Research Roy H. Wilkens, Prog.Ofcr.
Ballston Centre Tower One Code 322GG
800 N. Quincy St.
Arlington, VA 22217-5660

10. SPONSOR/MONITOR'S ACRONYM(S)
ONR

11. SPONSORING/MONITORING AGENCY REPORT NUMBER

12. DISTRIBUTION AVAILABILITY STATEMENT

13. SUPPLEMENTARY NOTES

14. ABSTRACT

ONR support for the Parent Agreement provided excellent quality MCS profiles from two settings: the wide, sand-rich passive continental margin offshore New Jersey, and the narrow, mud-dominated active margin off northern California. Preparing these data to meet the *STRATAFORM* goal of relating short-term "event stratigraphy" to the geologic record preserved in the continental terrace has been a lengthy and labor-intensive process in which student assistance from the AASERT program has been helpful. These data have heightened our understanding of the roles that storm reworking and sediment failure play in shaping the continental terrace.

15. SUBJECT TERMS
STRATAFORM

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			19b. TELEPONE NUMBER *(Include area code)*